

# Lower bounds for expected sample size of sequential procedures for the multinomial selection problems

Kareev I.

Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

---

## Abstract

© 2017 Taylor & Francis Group, LLC. In this article, lower bounds for expected sample size of sequential selection procedures are constructed for the problem of selecting the most probable event of  $k$ -variate multinomial distribution. The study is based on Volodin's universal lower bounds for expected sample size of statistical inference procedures. The obtained lower bounds are used to estimate the efficiency of some selection procedures in terms of their expected sample sizes.

<http://dx.doi.org/10.1080/03610926.2016.1222429>

---

## Keywords

Efficiency, Expected sample size, Indifference zone, Lower bound, Multinomial selection, Sequential procedure

## References

- [1] Bechhofer, R.E., (1954). A single-sample multiple decision procedure for ranking means of normal populations with known variances. *Ann. Math. Stat.* 25:16–39.
- [2] Bechhofer, R.E., Elmaghraby, S., Morse, N., (1959). A single-sample multiple-decision procedure for selecting the multinomial event which has the highest probability. *Ann. Math. Stat.* 30(1):102–119.
- [3] Bechhofer, R.E., Goldsman, D.M., (1985). Truncation of the Bechhofer-Kiefer-Sobel sequential procedure for selecting the multinomial event which has the largest probability. *Commun. Stat. Simul. Comput.* 14(2):283–315.
- [4] Bechhofer, R.E., Goldsman, D.M., (1986). Truncation of the Bechhofer-Kiefer-Sobel sequential procedure for selecting the multinomial event which has the largest probability (II):extended tables and an improved procedure. *Commun. Stat. Simul. Comput.* 15(3):829–851.
- [5] Bechhofer, R.E., Kiefer, J., Sobel, M., (1968). *Sequential Identification and Ranking Procedures*. Chicago:University Chicago Press.
- [6] Bechhofer, R.E., Santner, T.J., Goldsman, D.M., (1995). *Design and Analysis of Experiments for Statistical Selection, Screening, and Multiple Comparisons*. New York:Wiley.
- [7] Gibbons, J.D., Olkin, I., Sobel, M., (1977). *Selecting and Ordering Populations:A New Statistical Methodology*. New York:Wiley.
- [8] Gupta, S.S., (1956). On a Decision Rule for a Problem in Ranking Means (p. 208). University of North Carolina at Chapel Hill.
- [9] Gupta, S.S., Panchapakesan, S., (1979). *Multiple Decision Procedures:Theory and Methodology of Selecting and Ranking Populations*. New York:Wiley.
- [10] Kareev, I.A., (2013). Lower bounds for average sample size and efficiency of sequential selection procedures. *Theory Probab. Appl.* 57(2):227–242.

- [11] Kareev, I.A., (2014). Lower bound for the average sample size and the efficiency of ranking sequential procedures. *Theory Probab. Appl.* 58(3):503–509.
- [12] Kareev, I., (2016). Lower bounds for the expected sample size of sequential procedures for selecting and ranking of binomial and Poisson populations. *Lobachevskii J. Math.* 37(4):455–465.
- [13] Malyutov, M.B., (1983). Lower bounds for the mean length of a sequentially planned experiment. *Soviet Math. (Izvestiya VUZ. Matematika)* 27(11):21–47.
- [14] Mukhopadhyay, N., Solanky, T.K.S., (1994). *Multistage Selection and Ranking Procedures: Second-order Asymptotics*. New York: Dekker.
- [15] Nettleton, D., (2009). Testing for the supremacy of a multinomial cell probability. *J. Am. Stat. Assoc.* 104(487):1052–1059.
- [16] Tollefson, E., Goldsman, D., Kleywegt, A., Tovey, C., (2014). Optimal selection of the most probable multinomial alternative. *Sequential Anal.* 33(4):491–508. doi:10.1080/07474946.2014.961848.
- [17] Volodin, I.N., (1979). Lower bounds for average sample size and efficiency of statistical inference procedures. *Theory Probab. Appl.* 24(1):120–129.
- [18] Wald, A, (1950). *Statistical Decision Functions*(p. 179). Oxford, England: Wiley.